L Number	Hits	Search Text	DB	Time stamp
-	1723	request$3 with (client$1 adj2 service$1)	USPAT; US-PGPUB	2004/08/10 09:51
-	156	request$3 with (client$1 adj2 service$1) with (server$1 adj2 service$1)	USPAT; US-PGPUB	2004/08/09 17:46
-	83	(request$3 with (client$1 adj2 service$1) with (server$1 adj2 service$1)) and @ad<20010510	USPAT; US-PGPUB	2004/08/10 09:51
-	76	((request$3 with (client$1 adj2 service$1) with (server$1 adj2 service$1)) and @ad<20010510) and application$1	USPAT; US-PGPUB	2004/08/09 17:47
-	38	(((request$3 with (client$1 adj2 service$1) with (server$1 adj2 service$1)) and @ad<20010510) and application$1) and (pool$1 or queu$4)	USPAT; US-PGPUB	2004/08/09 17:48
-	2	(connection$1 near6 pool$1) with (client$1 adj2 service$1)	USPAT; US-PGPUB	2004/08/10 09:53
-	1	((connection$1 near6 pool$1) with (client$1 adj2 service$1)) and @ad<20010510	USPAT; US-PGPUB	2004/08/10 09:53
-	92	(connection$1 near6 pool$1) and (client$1 adj2 service$1)	USPAT; US-PGPUB	2004/08/10 09:53
-	46	((connection$1 near6 pool$1) and (client$1 adj2 service$1)) and @ad<20010510	USPAT; US-PGPUB	2004/08/10 09:53

C:\APPS\EAST\Workspaces\09-852604 Use pool of client services to handle user requests.wsp

US-PAT-NO: 6604046

DOCUMENT-IDENTIFIER: US 6604046 B1

TITLE: High-performance server architecture, methods, and
                software for spatial data

---------- KWIC ---------

Application Filing Date - AD (1):
20001020

Brief Summary Text - BSTX (11):
   In addition to this waiting problem, conventional servers in two-tier map
systems also suffer from design inflexibilities. For instance, these servers
are programmed to either treat all clients as thin clients by not allowing them
to host the mapping software or all clients as thick clients by forcing them to
host the mapping software. This means, for example, that servers geared for
thick **clients are unable to service** thin clients, such as mobile telephones or
personal-digital assistants, which have little memory capacity or little
tolerance for significant waits.

Brief Summary Text - BSTX (16):
   Other notable features of the exemplary system include a web server between
the clients and the map server. The exemplary web server provides a **pool of
persistent network connections** to the map server to reduce time for initiating
connections and thus to promote rapid response to map requests. Additionally,
the map server includes a service dispatcher for appropriately distributing
client requests across expandable sets of service pools, with each service pool
including two or more functionally identical service objects for executing a
particular map service. Exemplary services include map-data-access services,
geocoding services, street-routing services, map-image-display services, and
even custom user-defined services. The service pools are configurable to
expand in response to demand criteria and thus to dynamically scale the map
server to meet changing demands for map data and services.

Detailed Description Text - DETX (9):
   One or more of the software modules contains caching software, for example,
in the form of objects, enabling the establishing and maintaining of
map-related caches, such as caches 116.1 and 118.1 in clients 116 and 118.
Servlet 132 includes a FIFO-based **connection pool** 132.1 comprising a set of one
or more persistent socket connections 132.11, 132.12, and 132.13 to map server
140. (Although only three are shown, the exemplary embodiment can be
configured to includes any number of connections.) Map server 140 includes a
property file 140.1, a connection manager 141, a service dispatcher 142, a
map-data-access services pool 143, a shared map-data cache 144, a

BEST AVAILABLE COPY

08/10/2004, EAST Version: 1.4.1

geocoding-services pool 145, a street-routing-services pool 146, an external-map-access-services pool 147, a map-image-display-services pool 148, and a custom-application-services pool 149.

Detailed Description Text - DETX (10):
Connection manager 141 is coupled to socket connections 132.11-132.14. All client requests and corresponding responses feed through the connection manager, with the connection manager functioning in a handshaking capacity. Each socket connection essentially represents a thread through the map server. The connection manager also monitors the number of connections against a maximum number of connections set in the map-server property file 140.1 (which is described below in greater detail.) Thus, if **connection pool 132 attempts to open a new connection** because none of its present connections are available for use, the connection manager can prevent opening of the new connection depending on whether the maximum number of connections are already open. Related, some embodiments of the invention monitor the use of existing connections, closing those that have been inactive for too long as measured against a parameter in property file 140.1. This monitoring function can be placed within the connection manager or in another object or software module.

Detailed Description Text - DETX (41):
In block 212, the web server or more precisely the servlet passes the one or more requests to the map server. In the exemplary embodiment, this entails use of the first available open **connection in connection pool** 132 of web server 130. Use of an open **connection from the connection pool** avoids performance losses stemming from opening and closing a new connection to the map server for every request. (Note that the exemplary embodiment allows some clients, such as client 118, to use a separate connection to the map server. The use of this **connection outside of the connection pool** is transparent to the map server.)

Detailed Description Text - DETX (46):
Block 220 entails returning the results in the form of a response object to the client. This entails passing the response object back along a thread through the map server to the requesting client. More precisely, the response propagates back through the service **pool manager, through the service dispatcher and connection manager and connection pool** to the client.

Detailed Description Text - DETX (51):
In furtherance of the art, the present inventors have presented unique map systems and methods for communicating and handling map data with reduced wait times for users. The exemplary system communicates with clients of variable weight, implements client-side and server-side caching, maintains a **pool of persistent socket connections, creates and expands map-related service pools,** and allows distribution of service pools to other processors. Teachings of the present invention may also be applicable to other types of data servers, for example image servers, or any type of data server where rapid delivery is desired.

Claims Text - CLTX (1):
    1. A system for serving map data and map-related services over a computer
network to two or more clients, the system comprising: a web server including:
first means having a first associated URL for defining at least one of the
clients as a first type of map client; second means having a second associated
URL for defining at least another one of the clients as a second type of map
client; a map server including: a first map-service pool having two or more
first map-service objects or instances for answering requests from the clients
for a first map service; and a second map-service pool having two or more
second map-service instances for answering requests from the clients for a
second map service; and means for establishing and maintaining a **pool of two
or more persistent network connections** between the web server and the map
server.